3-DIMENSIONAL HABITAT MAPPING OF TWO MARINE RESERVES

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Introduction

Temperate rocky reefs are some of the most productive and diverse ecosystems on Earth, in part because they exhibit a great deal of spatial heterogeneity in habitat characteristics. We conducted detailed spatial surveys in two longstanding marine reserves on California's central coast, which can help us gain a better understanding of how habitat characteristics (e.g. relief, substrate type, and wave exposure) influence the composition of the associated marine community.

The Landels-Hill Big Creek Marine Reserve in Big Sur, CA and Hopkins Marine Reserve in Monterey, CA provide ideal study sites, given their marine protected status, permanent transect cables located 150 yards off-shore, and popularity among academic institutions for research studies and field training.

Methods

Depth

Started with an initial depth, then used a Rugosity Bar (Fig 1.) to measure the relative changes in depth across the cable.

Uniform Point Contact (UPC)

Used the Rugosity Bar as the UPC tool to collect substrate and sessile organism distributions in conjunction with the depths.

Swath (Belt)

Collected mobile invertebrate (>2.5cm), algae, and fish distributions in 1mx2mx2m volume swaths for the length of the cable.

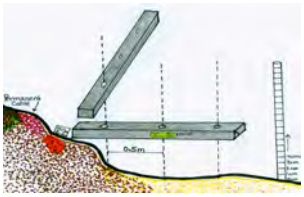

Fig. 1: Diagram of Rugosity Bar

Fig.2: Divers using the Rugosity Bar to collect UPC data

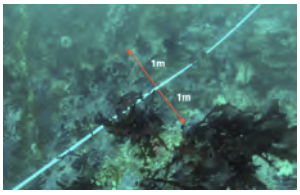

Fig.3: Swath transect at Big Creek Marine Reserve

Analyses

We created three-dimensional maps in Matlab, which incorporate distributions of the substrate and species at each site. A chi-squared test displayed the significant associations between substrate and sessile organisms.

Big Creek Cable

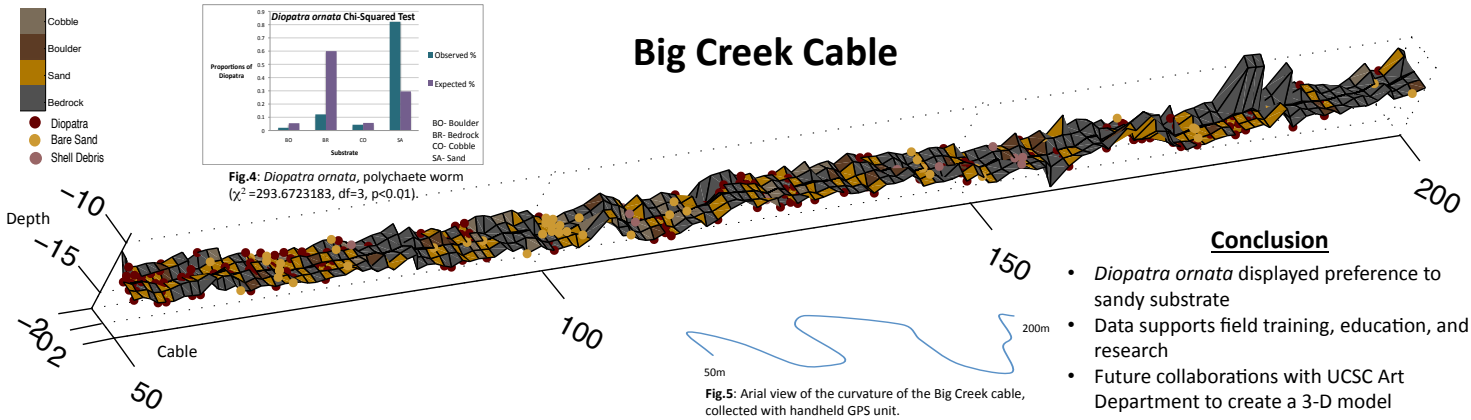

Fig.4: *Diopatra ornata*, polychaete worm (χ^2 =293.6723183, df=3, p<0.01).

Fig.5: Arial view of the curvature of the Big Creek cable, collected with handheld GPS unit.

Conclusion

- *Diopatra ornata* displayed preference to sandy substrate
- Data supports field training, education, and research
- Future collaborations with UCSC Art Department to create a 3-D model

Hopkins Cable

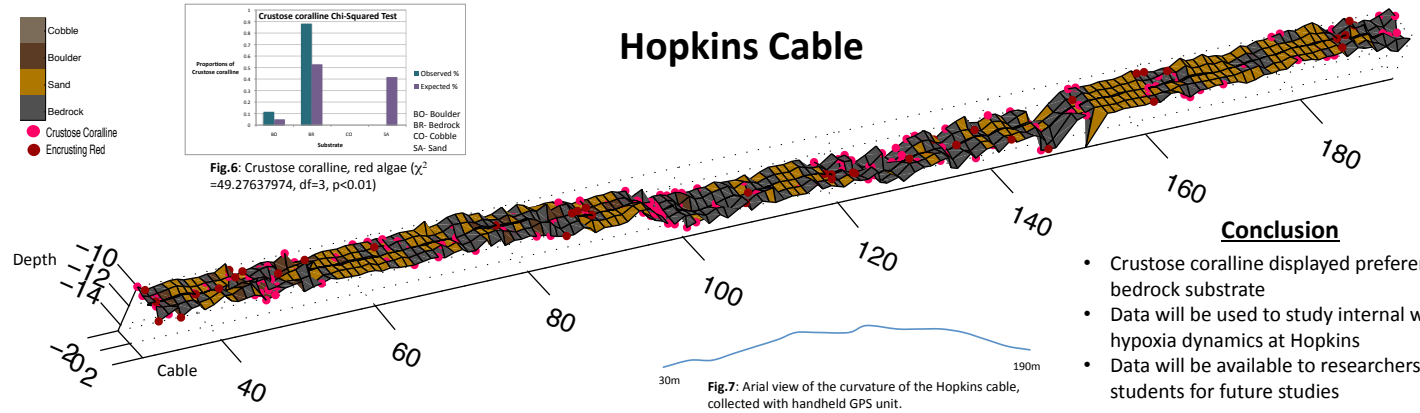

Fig.6: Crustose coralline, red algae (χ^2 =49.27637974, df=3, p<0.01)

Fig.7: Arial view of the curvature of the Hopkins cable, collected with handheld GPS unit.

Conclusion

- Crustose coralline displayed preference to bedrock substrate
- Data will be used to study internal wave-hypoxia dynamics at Hopkins
- Data will be available to researchers and students for future studies

Research Divers

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